



## **Montana Fish, Wildlife & Parks**

4600 Giant Springs Rd.  
Great Falls, MT 59405

February 12, 2013

Dear Interested Party:

The enclosed draft Environmental Assessment (EA) has been prepared regarding a potential grazing lease renewal on the Beartooth Wildlife Management Area (BTWMA). The 32,000 acre WMA is located in west-central Montana along the western and northern edge of the Big Belt Mountains, occupying land in both Lewis and Clark and Cascade Counties. Questions and comments on the EA will be accepted through March 8, 2013. The proposed grazing lease would allow cattle to be utilized as a management tool to remove residual vegetation, thus enhancing the availability and palatability of elk and mule deer forage on that portion of the WMA to be grazed. This portion of the WMA has been successfully grazed in a similar fashion with adjacent and cooperating lessee Sieben Live Stock Company for 21 years as part of a larger 3-pasture rest-rotation grazing system on 21,440 acres.

If you need additional copies of the draft EA, please contact Montana Fish, Wildlife & Parks in Great Falls at (406) 454-5840. A copy of the draft EA is also available on Montana Fish, Wildlife & Parks' website at <http://fwp.mt.gov> – "Recent Public Notices".

Please send any written comments to the following address:

Beartooth WMA Grazing EA Comments  
Montana Fish, Wildlife & Parks  
4600 Giant Springs Rd.  
Great Falls, MT 59405

Or email comments to: [cloecker@mt.gov](mailto:cloecker@mt.gov)

Sincerely,

A handwritten signature in black ink, appearing to read "Graham Taylor". The signature is stylized with a large, looping "G" and a long, sweeping "T".

Graham Taylor  
Montana Fish, Wildlife & Parks  
Region 4 Wildlife Manager  
Great Falls, MT

Enclosed: Draft Beartooth WMA Grazing Environmental Assessment – Staunten Cow Camp



## **Draft Environmental Assessment**

### **BEARTOOTH WILDLIFE MANAGEMENT AREA STAUNTON COW CAMP GRAZING LEASE**

#### **PART I. PROPOSED ACTION DESCRIPTION**

##### **1. Type of proposed state action:**

Montana Fish, Wildlife & Parks (FWP) proposes to lease approximately 4,960 acres of the Beartooth Wildlife Management Area (BTWMA) for cattle grazing to better manage vegetation for wildlife cover and forage to adjoining Landowner Sieben Live Stock Company for a six-year period.

##### **2. Agency authority for the proposed action:**

FWP has the authority under Section 87-1-210 MCA to protect, enhance and regulate the use of Montana's fish and wildlife resources for public benefit now and in the future. In addition, in accordance with the Montana Environmental Policy Act, Montana Fish, Wildlife & Parks (FWP) is required to assess the impacts that any proposal or project might have on the natural and human environments. Further, FWP's land lease-out policy, as it pertains to the disposition of interest in Department lands (89-1-209) requires an Environmental Assessment (EA) to be written for all new grazing leases, lease extensions or lease renewals.

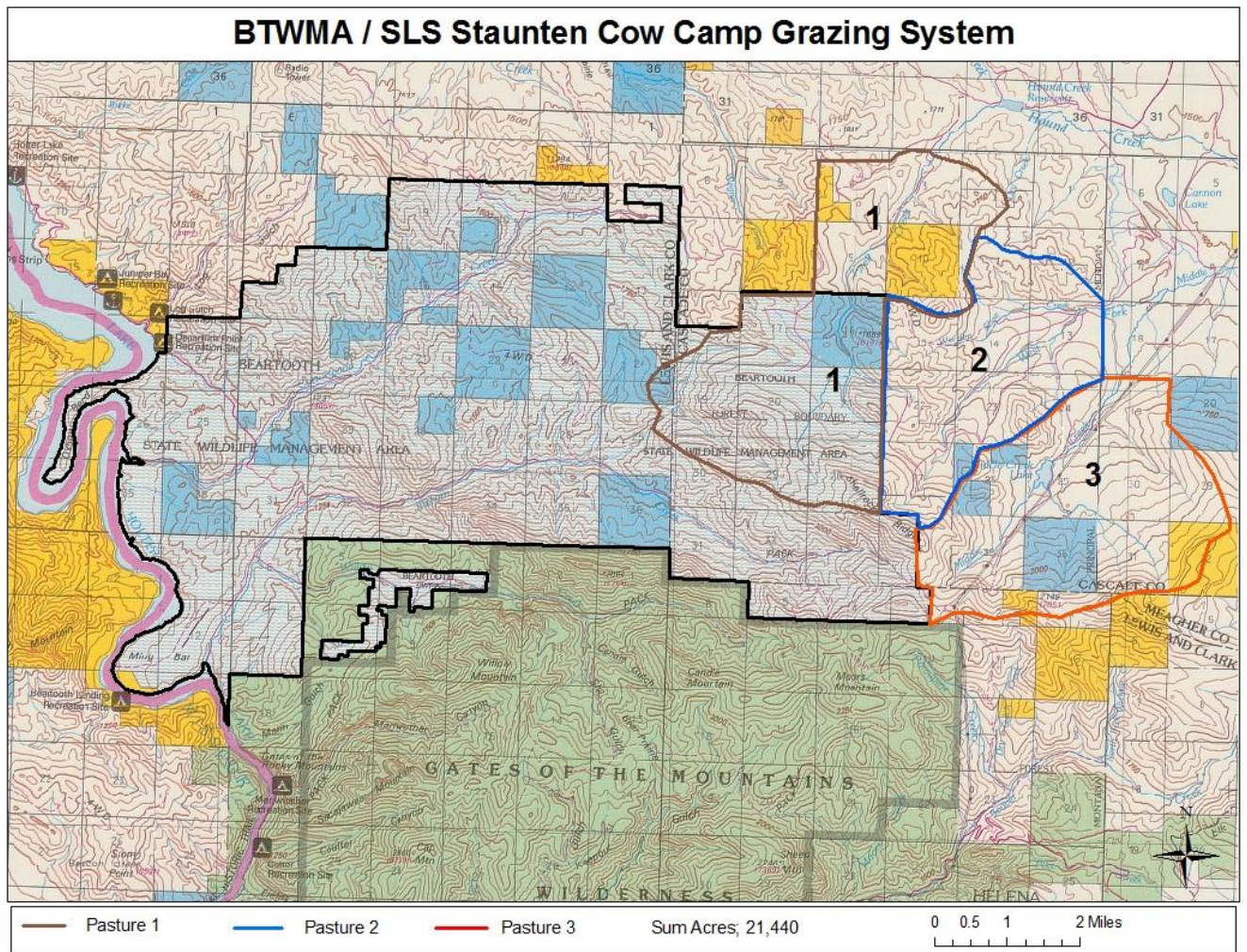
##### **3. Anticipated Schedule:**

Grazing Schedule(s): May 15 to July 15 *or* July 15 to September 1 *or* Complete Rest  
Term of Grazing: 6 year lease

##### **4. Location affected by proposed action:**

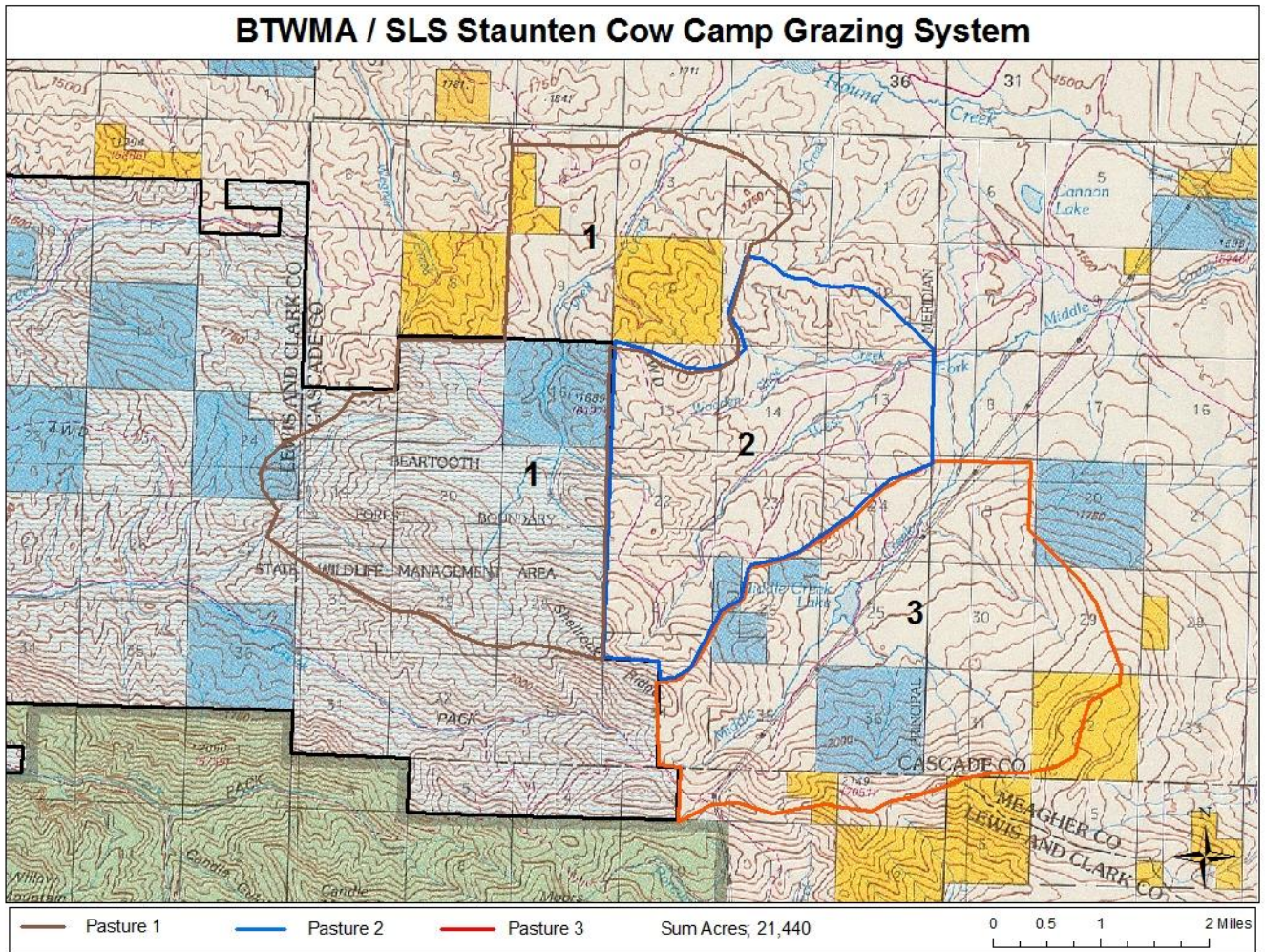
The 32,000 acre BTWMA is located in west-central Montana along the western and northern edge of the Big Belt Mountains, occupying land in both Lewis and Clark and Cascade Counties. Major drainages, including Cottonwood, Elkhorn and Willow Creeks, flow into Holter Lake, an impoundment on the Missouri River. Elevation on this rugged, mostly mountainous WMA ranges from 3,578 to 6,917 feet. The Area was purchased in 1970 by the Montana Department of Fish, Wildlife and Parks from the M. Pierce Milton estate. The proposed 6-year grazing lease renewal, which includes a portion of the BTWMA as part of a larger 21,440 acre rest rotation grazing system, has been in operation for the past 21 years. See Appendix B for complete grazing system details.

**Figure 1. Map of Beartooth WMA / SLS Rest Rotation Grazing System**





**Figure 2. Map of Beartooth WMA / SLS Rest Rotation Grazing System**



**Project size:**

	<u>Acres</u>		<u>Acres</u>
(a) Developed:		(d) Floodplain	<u>0</u>
Residential	<u>0</u>		
Industrial	<u>0</u>	(e) Productive:	
(existing shop area)		Irrigated cropland	<u>0</u>
(b) Open Space/	<u>0</u>	Dry cropland	<u>0</u>
Woodlands/Recreation		Forestry	<u>~750</u>
(c) Wetlands/Riparian	<u>~50</u>	Rangeland	<u>~4,160</u>
Areas		Other	<u>    </u>

**6. Permits, Funding & Overlapping Jurisdictions:**

- (a) **Permits:** None required
- (b) **Funding:** NA
- (c) **Other Overlapping or Additional Jurisdictional Responsibilities:** None

**7. Narrative summary of the proposed action:**

See Appendix B. BEARTOOTH WMA / SIEBEN LIVE STOCK STAUNTEN COW CAMP  
GRAZING SYSTEM PLAN

**8. Description and analysis of reasonable alternatives:**

**Alternative A: No Action**

- Decadent residual vegetation will remain, and the area will become unattractive to elk, mule deer and other big game species.
- Mule deer, elk and other big game will likely utilize adjacent private land, especially during spring through falls months.
- Continued concern by some neighboring landowners regarding fire danger (build-up of vegetation) on the BTWMA.

**Alternative B: Proposed Action**

- Managed vegetation cycles across a 3-year rest rotation period.
- Soil and plant disturbance that will benefit seedling establishment of desirable plant species.
- Two of three years during grazing treatment each pasture has growing season rest for plant root development and maintenance.
- One of three years one pasture in system has complete rest from grazing for plant health and big game winter range.
- Provide for better spring and summer green-up vegetation conditions for elk, mule deer and other wildlife species; thereby reducing elk, mule deer and other big game usage of adjacent private property.
- Some segments of the general public may disapprove of cattle grazing on the BTWMA.
- Continued strong relations with area Landowners.
- Promote maximum plant production, vigor and nutrient content.

If the No Action alternative is chosen, FWP would continue to manage the WMA for the benefit of wildlife species and for public access. Current services and maintenance of the WMA would continue. No impacts to environmental or human resources would be expected to occur as a result of livestock grazing given that the area wouldn't be grazed by livestock.

## **PART II. ENVIRONMENTAL REVIEW CHECKLIST**

Below is the evaluation of the impacts of the **Proposed Action**.

### **PHYSICAL ENVIRONMENT**

<b>1. <u>LAND RESOURCES</u></b>  <b>Will the proposed action result in:</b>	<b>IMPACT *</b>					
	<b>Unknown</b>	<b>None</b>	<b>Minor</b>	<b>Potentially Significant</b>	<b>Can Impact Be Mitigated</b>	<b>Comment Index</b>
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil, which would reduce productivity or fertility?			X			1b
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?			X			1d
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

1b/d. Some impacts to soil conditions may occur due to trampling, trailing or grazing in localized, high use areas, especially around water sources. The grazing capacity estimate is believed to be a conservative estimate, so the risk of overgrazing-induced erosion should be minimal. Hoof action from livestock grazing should provide a positive benefit to soil quality by helping to break down old residual vegetative material, thereby, returning nutrients to the soil.

<b>2. <u>AIR</u></b>  <b>Will the proposed action result in:</b>	<b>IMPACT *</b>					
	<b>Unknown</b>	<b>None</b>	<b>Minor</b>	<b>Potentially Significant</b>	<b>Can Impact Be Mitigated</b>	<b>Comment Index</b>
a. Emission of air pollutants or deterioration of ambient air quality? (Also see 13 (c).)		X				
b. Creation of objectionable odors?			X			2b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. For P-R/D-J projects, will the project result in any discharge, which will conflict with federal or state air quality regs? (Also see 2a.)		N/A				

2b. The proposed action would have no effect on the ambient air quality. Some individuals may find the smell of grazing livestock on the WMA objectionable. The area has been in a grazing rotation for the last 21 years under similar conditions and terms. In addition, livestock graze private property adjacent to the WMA, so the smell of grazing livestock is already present in the general area. Cattle on the landscape are a common practice in Montana and in the West.

3. <b><u>WATER</u></b>  Will the proposed action result in:	IMPACT *					
	Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?		X				
b. Changes in drainage patterns or the rate and amount of surface runoff?			X			3b
c. Alteration of the course or magnitude of floodwater or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?		X				
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?		X				
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. For P-R/D-J, will the project affect a designated floodplain? (Also see 3c.)		N/A				
m. For P-R/D-J, will the project result in any discharge that will affect federal or state water quality regulations? (Also see 3a.)		N/A				

3b. Live water sources are abundant on the Area. While there is the potential for any snowmelt or rainstorm run-off from the area to eventually reach Elkhorn, Willow and Tyrell Creeks, impacts on water quality, quantity and distribution will be minimal. The level of grazing recommended will leave adequate vegetative material to protect the soil and minimize potential run-off. Grazing will also not occur until late spring and/or early summer, after primary snowmelt has occurred.

<b>4. <u>VEGETATION</u></b>  <b>Will the proposed action result in?</b>	<b>IMPACT *</b>					
	<b>Unknown</b>	<b>None</b>	<b>Minor</b>	<b>Potentially Significant</b>	<b>Can Impact Be Mitigated</b>	<b>Comment Index</b>
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X		No	4a
b. Alteration of a plant community?			X		No	4b
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?			X		Yes	4e
f. For P-R/D-J, will the project affect wetlands, or prime and unique farmland?		N/A				

4a/b. While vegetation cover and quantity will be decreased as livestock are grazing a specific pasture, vegetation quality will increase following grazing as a part of the 3-year grazing cycle. The “rest periods” and “post growing season” grazing allows for 2 of every 3 years in the rotation, plants have growing season rest. Grazing will enhance the availability and palatability of spring forage in the area and improve overall plant condition. Plant and soil disturbance as the result of grazing may enhance seed placement, germination and seedling establishment for both native and nonnative plant species. Monitoring transects in 2011 revealed the grazing system over the last 21 years has increased forage production, improved plant species diversity, increased desired plant species, improved energy flow and plant vigor. Well dispersed water resources will allow widespread livestock distribution. The proposed grazing is expected to reduce the potential fire danger from standing vegetation in the grazed pasture. The reduction in fire fuels would be appreciated by adjacent landowners.

4e. FWP currently manages noxious weeds on the BTWMA through chemical, mechanical and biological control per the guidelines set forth in FWP’s 2008 Integrated Noxious Weed Management Plan. The acres grazed by the cattle would be monitored for new weed infestations. Very few noxious weeds have been observed in the proposed grazing area.

<b>5. <u>FISH/WILDLIFE</u></b>  <b>Will the proposed action result in:</b>	<b>IMPACT *</b>					
	<b>Unknown</b>	<b>None</b>	<b>Minor</b>	<b>Potentially Significant</b>	<b>Can Impact Be Mitigated</b>	<b>Comment Index</b>
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X			5b
c. Changes in the diversity or abundance of nongame species?	X					5c
d. Introduction of new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?			X			5f
g. Increase in conditions that stress wildlife populations or			X			5g



limit abundance (including harassment, legal or illegal harvest or other human activity)?						
h. For P-R/D-J, will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f.)		N/A	X			5f
i. For P-R/D-J, will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d.)		N/A				

5 b/c/f/g. While livestock grazing activities will reduce the amount of forage in a pasture during the grazing lease cycle and temporarily displace big game from the area to be grazed, the project will have a positive long-term impact on elk and mule deer habitat. The expected short-term positive impact is that decadent residual vegetation will be removed, which should enhance spring green-up conditions and provide more palatable forage for grazing wildlife. Livestock grazing may also enhance the winter range habitat for elk and mule deer in the long term. Sufficient forage is available to elk, mule deer and other big game on the remainder of the BTWMA to offset any short-term loss of forage due to livestock.

## HUMAN ENVIRONMENT

6. <u>NOISE/ELECTRICAL EFFECTS</u>  Will the proposed action result in:	IMPACT *					
	Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Increases in existing noise levels?		X				
b. Exposure of people to serve or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

The proposed action would have no effect on existing noise level since there would be no change in the level of activity on FWP-owned property.

7. <u>LAND USE</u>  Will the proposed action result in:	IMPACT *					
	Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?		X				
d. Adverse effects on or relocation of residences?		X				

With the exception of a possible spring black bear hunter on a rare occasion, grazing activity would occur outside the time frame of any big game archery or rifle seasons.

<b>8. <u>RISK/HEALTH HAZARDS</u></b>  <b>Will the proposed action result in:</b>	<b>IMPACT *</b>					
	<b>Unknown</b>	<b>None</b>	<b>Minor</b>	<b>Potentially Significant</b>	<b>Can Impact Be Mitigated</b>	<b>Comment Index</b>
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?		X				
b. Affect an existing emergency response or emergency evacuation plan, or create a need for a new plan?		X				
c. Creation of any human health hazard or potential hazard?		X				
d. For P-R/D-J, will any chemical toxicants be used? (Also see 8a)		N/A				

Chemical spraying is part of FWP's weed management plan to limit the infestation of noxious weeds on its properties per guidance of the 2008 Integrated Weed Management Plan. Weed treatment and storage and mixing of the chemicals would be in accordance with standard operating procedures.

<b>9. <u>COMMUNITY IMPACT</u></b>  <b>Will the proposed action result in:</b>	<b>IMPACT *</b>					
	<b>Unknown</b>	<b>None</b>	<b>Minor</b>	<b>Potentially Significant</b>	<b>Can Impact Be Mitigated</b>	<b>Comment Index</b>
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

The proposed action would have no effect on local communities, increase traffic hazards, or alter the distribution of population in the area.

<b>10. <u>PUBLIC SERVICES/TAXES/UTILITIES</u></b>  <b>Will the proposed action result in:</b>	<b>IMPACT *</b>					
	<b>Unknown</b>	<b>None</b>	<b>Minor</b>	<b>Potentially Significant</b>	<b>Can Impact Be Mitigated</b>	<b>Comment Index</b>
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify:		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new		X				

facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?						
d. Will the proposed action result in increased use of any energy source?		X				
e. **Define projected revenue sources						10e
f. **Define projected maintenance costs.						10f

10e. The exact amount of revenue from the grazing lease will depend upon the number of AUM's grazed X the DNRC grazing rate. The 2013 grazing rate is established using the state DRNC rate. Revenue from this grazing system is detailed in Appendix B, Table 2.

10f. Additional costs to FWP will include periodic monitoring of the grazing system; no other costs are anticipated. Lessee will be responsible for maintenance of the pasture fences and water sources during the grazing lease period.

11. <u>AESTHETICS/RECREATION</u>  Will the proposed action result in:	IMPACT *					
	Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?			X			11a
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report.)			X			11c
d. For P-R/D-J, will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c.)		X				

11a. Domestic livestock and signs of livestock use on the BTWMA may be objectionable to some segments of the public. A well established history of livestock grazing on the WMA exists, with no apparent conflicts.

11c. Livestock and livestock sign on a FWP wildlife management area may seem out of place for some segments of the public. However, portions of the WMA have been grazed as recently as summer, 2012.

12. <u>CULTURAL/HISTORICAL RESOURCES</u>  Will the proposed action result in:	IMPACT *					
	Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. **Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				
d. For P-R/D-J, will the project affect historic or cultural resources? Attach SHPO letter of clearance. (Also see 12.a.)		N/A				

## SIGNIFICANCE CRITERIA

13. <u>SUMMARY EVALUATION OF SIGNIFICANCE</u>  Will the proposed action, considered as a whole:	IMPACT *					
	Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources that create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects, which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?		X				
f. For P-R/D-J, is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e.)		N/A				
g. For P-R/D-J, list any federal or state permits required.		N/A				





**Evaluation and listing of mitigation, stipulation, or other control measures enforceable by the agency or another government agency:**

The grazing lease agreement between FWP and the lessee would include all lease stipulations and enforceable control measures. These are identified in the lease agreement and pertinent attachments to same.

**PART III. NARRATIVE EVALUATION AND COMMENT**

The proposed grazing lease on the Beartooth WMA will be used to improve vegetative conditions for big game species that may utilize the WMA particularly during the spring, summer and fall time periods. The rest-rotation grazing system allows for one of the three pastures to be completely rested during any given year to allow for plant health and big game winter range.

The proposed project is not expected to have significant impacts on the physical or human environment. Identified impacts are expected to be minor and of short duration. The project is expected to benefit wildlife habitat conditions in the long-term. These are borne out by the 21-year history of grazing under similar conditions in the same area of the WMA.

**PART IV. PUBLIC PARTICIPATION**

**1. Public involvement:**

The public will be notified in the following manner to comment on this current EA, the proposed action and alternatives:

- Two public notices in each of these papers: Helena: *Helena Independent Record* and Great Falls: *Great Falls Tribune*
- Public notice on the Fish, Wildlife & Parks web page: <http://fwp.mt.gov> – “Recent Public Notices”

Copies of this environmental assessment will be distributed to neighboring landowners and interested parties to ensure their knowledge of the proposed project. The proposed grazing lease was presented and discussed at the local Devil’s Kitchen Working Group meeting in Cascade on Feb 1, 2013.

This level of public notice and participation is appropriate for a project of this scope having limited and very minor impacts, which can be mitigated.

**2. Duration of comment period:**

The public comment period will extend for twenty-one (21) days from February 15 through March 8, 2013. Written comments will be accepted until 5:00 p.m., March 8, 2013 and can be mailed to the address below:

Beartooth WMA Grazing Lease  
Montana Fish, Wildlife & Parks  
4600 Giant Springs Road  
Great Falls, MT 59405  
or email to: [cloecker@mt.gov](mailto:cloecker@mt.gov)

## **PART V. EA PREPARATION**

1. **Based on the significance criteria evaluated in this EA, is an EIS required? (YES/NO)?** No
  - **If an EIS is not required, explain why the EA is the appropriate level of analysis for this proposed action.** It has been determined that no significant impacts to the physical and human environment will result due to the proposed action alternative, nor will there be significant public controversy over the proposed action; therefore, an Environmental Impact Statement is not required.
2. **Person responsible for preparing the EA:**

Cory Loecker  
FWP Area Wildlife Biologist  
4600 Giant Springs Rd.  
Great Falls, MT 59405  
(406) 454-5840  
[cloecker@mt.gov](mailto:cloecker@mt.gov)

## APPENDIX A: LEGAL DESCRIPTION FOR BEARTOOTH WMA GRAZING AREA

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T 14N R01W

s16<sup>1</sup>

s17

s18, S 1/2

s19

s20

s21

s28 Portion

s29 Portion

s30 Portion of N 1/2

T14N R02W

s24 NE 1/4 of SE 1/4<sup>1</sup> and E 1/2 of NE 1/4

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<sup>1</sup>DNRC ownership, leased by FWP



## **Appendix B. Beartooth WMA / Sieben Live Stock Staunten Cow Camp Grazing System Plan**

### **INTRODUCTION**

The 32,000 acre Beartooth Wildlife Management Area (BTWMA) is located in west-central Montana along the western and northern edge of the Big Belt Mountains, occupying land in both Lewis and Clark and Cascade Counties. Major drainages, including Cottonwood, Elkhorn and Willow Creeks, flow into Holter Lake, an impoundment on the Missouri River. Elevation on this rugged, mostly mountainous WMA ranges from 3,578 to 6,917 feet. The WMA was purchased in 1970 by Montana Fish, Wildlife & Parks from the M. Pierce Milton estate.

Overall management goals for the BTWMA are:

"To manage for highly productive, diverse vegetative communities that will provide quality forage and cover for native wildlife species, emphasizing elk, while providing public hunting opportunity and other outdoor recreation."

Consistent with that goal, certain management objectives have been identified. They include (but are not limited to) the following:

"To provide the year-long habitat requirements of resident wildlife, including elk, bighorn sheep, mule deer, white-tailed deer, antelope, black bear, upland game birds, furbearers and non-game wildlife."

"To provide winter range for 5 months for an additional elk, mule, white-tailed deer and bighorn sheep from surrounding public and private lands."

"To manage grassland vegetation, with emphasis on rough fescue (Fesc.) and other native bunchgrass species, so that wildlife species, particularly big game, are provided abundant and nutritious forage."

Other management objectives address elk depredations, fisheries, hunting and recreational opportunities and deed restrictions addressing management, subdivision and commercial limitations on the BTWMA. In 1992, a rest-rotation grazing system was implemented on a portion of the BTWMA in cooperation with adjacent Landowner Sieben Live Stock Company to meet goals listed above. The grazing system has been in place for 21 years (7 grazing system cycles). It is proposed that this rest-rotation grazing system be continued for another six years (two grazing cycles).

### **GRAZING GOALS AND OBJECTIVES**

Any proposal for grazing domestic livestock under any circumstances must meet BTWMA management goals and objectives as listed above. Further, goals and objectives specific to the implementation of a grazing system must be developed and followed. The following are offered to meet those needs.

#### **GOAL:**

To provide maximum vegetative cover (abundance) and quality plant composition (nutrition/palatability) as related to wildlife needs, soil and watershed protection on elk and other big game seasonal ranges associated with the BTWMA.

## OBJECTIVES:

- \* Promote succession of desired native plant species into areas previously abused by domestic livestock grazing which occurred prior to FWP acquisition in 1970.
- \* Promote maximum plant production, vigor and nutrient content.
- \* Increase the attractiveness of spring, summer and late fall forage to elk, thereby influencing distribution and minimizing depredation to adjacent private lands.
- \* Implement a long term, beneficial grazing system on lands described, and a significant portion of elk winter range in the upper Tyrell, Cottonwood and Elkhorn drainages.
- \* Expand the effective influence of the BTWMA for wintering elk by bringing adjacent private land into similar management, simultaneously meeting Landowner needs and tolerance.
- \* Heal bare ground and stop soil loss
- \* Enhance growth and restoration of desirable plant species
- \* Utilize hoof action of livestock to break soil crust and plant seeds in the “graze after seed ripe” treatment
- \* Stimulate root structure and build drought resistance through rest periods of the system

## LOCATION/AREA DESCRIPTION

In 1992, a three-pasture rest rotation system was implemented on the approximately 21,440 acres involved (Figure 1). Half of Pasture 1 is located on the BTWMA, with the remainder on Sieben Live Stock lands. Pastures 2 & 3 of the system are located entirely Sieben Live Stock private lands. Bureau of Land Management Lands (BLM) incorporated in these pastures are leased by Sieben Live Stock.

Watersheds included in the area are Cottonwood, Elkhorn and Tyrell Creeks. The area and its vegetative composition have been previously described by Pyrah, 1985, *in Livestock Grazing Potential on a Wildlife Management Area - the Beartooth WMA*. Legal descriptions of the BTWMA land included in this proposal are listed in Appendix A.

The grazing system is located in the northeast quarter of the BTWMA and adjacent private lands owned and operated by the Sieben Live Stock Company (Figure 1). Total size of grazing system equals approximately 21,440 acres, including the following:

Approximate acreage of each pasture includes:

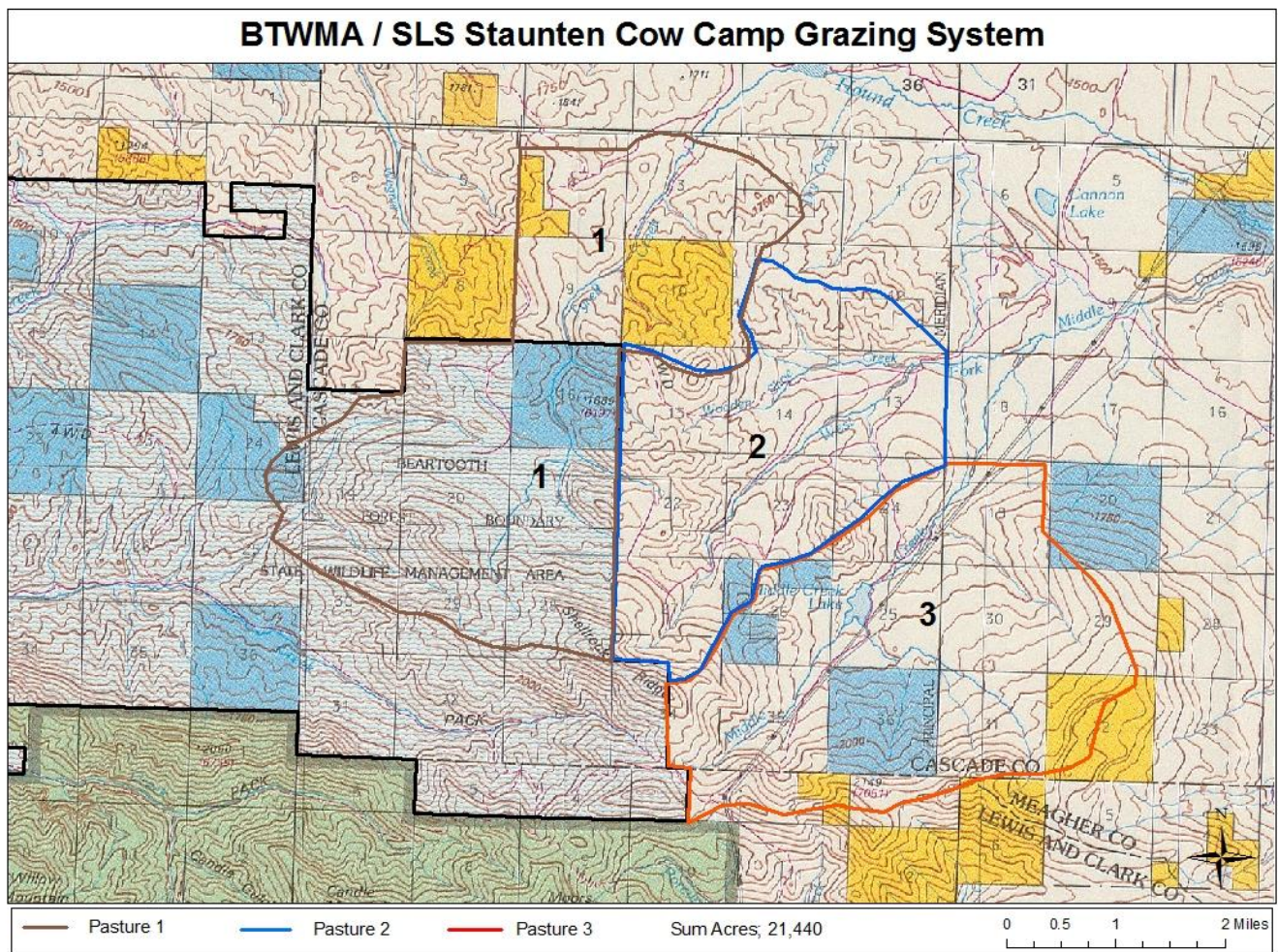
Pasture 1--8,160 acres (BTWMA @ 4,960 + private SLS @ 3,200)

Pasture 2--6,880 acres Sieben Live Stock (Wooden Shoe + Dog Cr)

Pasture 3--6,400 acres Sieben Live Stock (Middle Creek Basin)

SUM = 21,440 acres

**Figure 1. Map of the BTWMA/Sieben Live Stock rest-rotation grazing system pastures.**



### GRAZING SYSTEM DETAILS

Dates of grazing use are dictated by 1) plant phenology to include spring green-up, plant availability and seed ripening and 2) forage consumption in the active pasture(s) and 3) hunting and recreational demands upon the area. Bluebunch wheatgrass (Agsp.) will be used as the principal seed ripe indicator. This species is most abundant and expected to occur on relatively drier sites, as opposed to rough fescue (Fesc.), which is favored on more moist aspects.

General grazing season dates for these events approximate the following:

Early season graze (A treatment) May 15 – July 15

Post seed ripe graze (B treatment) July 15 – Sept 1

Complete Rest (C treatment)

Table 1 details the grazing scheme to be used from 2013 through 2018 in the BTWMA/Sieben Live Stock grazing program. This is a continuation of the scheme employed from 1992 through 2012. This matrix will be used in conjunction with the attached map of the project area to determine grazing schedules and location.

**Table 1. Sequence of grazing treatments and pasture number, 2013 - 2018.**

<b>P A S T U R E #</b>	<b>YEAR</b>						
		<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
	<b>1</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>	<b>C</b>
	<b>2</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>A</b>
	<b>3</b>	<b>C</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>

Treatments

*A = May 15 – July 15 Treatment*

*B = July 15 – September 1 Treatment*

*C = Complete Rest*

Pasture number and name:

*1 = Tyrell/BTWMA (8,160 acres)*

*2 = Wooden Shoe/Dog Cr (6,880 acres)*

*3 = Middle Creek (6,400 acres)*

*SUM = 21,440 acres*

An average monthly stocking rate is indicated based on available forage and water supply, pasture size and layout, desired grazing effectiveness and previously observed effectiveness of livestock grazing abilities in the immediate area. Using turn-on and turn-off dates and seed ripe (May 15, September 1 and July 15, respectively) as reference points, each pasture could provide the following measured grazing capacity in any one year (unit of measure = animal unit month):

Full season grazing (A) = 3,500 AUM's

Seed ripe grazing (B) = 1,750 AUM's

Rest (C) = 0 AUM's

Flexibility is critical in effective operation of a grazing system of this magnitude and of such public interest. While certain dates, stocking rates and pasture layouts are represented as actual planned events and timing, each is subject to alteration given prudent examination of on-the-ground events as the program evolves. Climatological events and their influence upon plant phenology will dictate adjustments in grazing schedules, as will actual livestock distribution predict the uniform level of grazing treatment and stocking rate throughout an entire pasture. Only the actual grazing scheme (including one full year of absolute rest) is held inviolate and not subject to change.

**MONITORING AND PUBLIC INVOLVEMENT**

Photo transects and/or monitoring photos will continue to be documented as per Pyrah's work previously referenced. Trends in vegetation composition will likewise be monitored through the use of existing transects to determine changes in species composition, cover and frequency. FWP's Range Specialist and Area Wildlife Biologist annually monitor photo points. Ranch Advisory Partners, LLC also monitors the grazing system as part of Sieben Live Stocks Ranch monitoring program (Appendix C).



Stocking rates, period of use and grazing fees collected on the BTWMA cow camp grazing lease are presented in Table 2. Stocking rates ranged from 578 to 2,348 AUM's during the 21 years of the grazing lease. Stocking rates were generally well below maximum estimated stocking rates.

**Table 2. BTWMA Staunten Cow Camp Cattle Stocking Rates, 1992-Present.**

<b>Year</b>	<b>Dates of Use</b>	<b>AUM's</b>	<b>Days of Use</b>	<b>AUM's/ acre<sup>1</sup></b>	<b>Acres/ AUM<sup>1</sup></b>	<b>% AUM's Allowed<sup>2</sup></b>	<b>Grazing Fee</b>
1992	5/21 – 8/25	2,125	97	.43	2.3	61%	\$10,624.00
1993	8/2 – 9/30	578	60	.12	8.6	33%	\$5,780.00
1994	Rested						0
1995	6/21 – 8/30	1,645	68	.33	3.0	47%	\$8,225.00
1996	7/27 – 9/29	1,204	66	.24	4.1	69%	\$7,826.00
1997	Rested						0
1998	6/1 – 9/1	1,584	86	.32	3.1	45%	\$10,296.00
1999	8/3 – 9/29	1,224	57	.25	4.1	70%	\$7,956.00
2000	Rested						0
2001	5/29-8/31	1,830	93	.42	2.7	52%	\$13,725.00
2002	8/1-9/27	1,375	58	.27	3.6	61%	\$10,312.50
2003	Rested						0
2004	6/28-8/31	1,536.5	64	.31	3.2	44%	\$11,523.75
2005	8/10-10/6	1,882	57	.39	2.6	108%	\$14,115.00
2006	Rested						0
2007	6/15 – 7/30	1,482.5	45	.30	3.3	42%	\$11,119.00
2008	8/1 – 9/11	2,348	42	.47	2.1	134%	\$17,610.00
2009	Rested						0
2010	6/9 – 7/28	1,944	49	.39	2.55	55%	\$14,580
2011	7/29 – 9/2	1,048	35	.21	4.73	60%	\$7,860
2012	Rested						0

<sup>1</sup> Based on 4,960 acres in Beartooth / DNRC pasture

<sup>2</sup> Based on maximum of 3,500 AUMs in full season, 1,750 AUMs in post-seed ripe grazing years

One result of livestock grazing is the reduction of standing dead grass litter and promotion of succulent new re-growth. Elk regularly utilize grazed areas, especially during spring and fall green-up periods. The rest-rotation grazing system also improves forage conditions on the private land involved, promoting landowner tolerance of elk utilizing private land. Although monthly surveys are not conducted on elk on the BTWMA, observations indicate elk utilize the grazed areas year-round, but especially during spring, summer and fall months due to the north facing aspect of the BTWMA pasture. The grazing unit gives elk and other wildlife a wider variety of grass conditions to choose from, since the majority of the BTWMA is excluded from cattle grazing and receives only light to moderate grazing by big game animals.

During initial setup of the grazing system in the 1990's, Sieben Live Stock installed six water ranks on the BTWMA pasture to provide better cattle distribution in the uplands and to reduce cattle use of the Tyrell Creek riparian zone. This has worked very well to better distribute cattle throughout the system. In 2008, four more stock tanks were installed on the BTMWA by Sieben Live Stock to improve cattle distribution. Elk, deer and other game and non-game species continue to benefit from the increased water availability. In 2003 and 2006 an aspen stand cattle enclosure fence was constructed to keep livestock (but allow wildlife) from utilizing the stand (Exhibit 1).

**Exhibit 1. Aspen stand cattle enclosure, 2012.**



Livestock grazing on publicly owned FWP Wildlife Management Areas can sometimes draw attention from recreational users and environmental groups. Owing to the keen public interest on this WMA, its resources and accessibility, public education and information has been, and continues to be, necessary. These efforts include contact with the public via media outlets, public meetings and informal contacts with the public that utilize the BTWMA during summer months and hunting seasons. Grazing tours have been offered and provided to sportspeople, Landowners, Grazing County Commissioners, FWP Foundation members, FWP Commissioners, Legislators, Russell Country Sportsmen, Russell Country Backcountry Horsemen, East Front Backcountry Horsemen, MT Stockgrowers Association and the Devil's Kitchen Management Team, to name a few, with full endorsement. In 2010, a range and elk management tour of the BTWMA and Sieben Live Stock lands was provided to the Ranch Management Consultants: Executive Link Program with 90-95 people attending, coming from CA, CO, ID, KS, MO, MT, NE, NV, OR, TX, UT, WA, WY and Monterrey, Mexico. The existing grazing system is currently meeting and exceeding the objectives of both FWP and Sieben Live Stock Company.

**PUBLIC ACCESS**

This grazing lease requires that the lessee provide public hunting opportunities on their own private lands. Sieben Live Stock has 68,400 acres enrolled in FWP's Block Management Program and has been since the Program's inception. Sieben Live Stock, which adjoins the BTWMA, provides at least 1,500 public hunter days annually for all big game species and sexes and is a model Landowner to area sportspeople.

**SPECIAL CONDITIONS**

Annual cash rental fee will be the state DNRC rate / AUM in exchange for mutually negotiated services described. This state DNRC rate agreement requires the lessee to construct and maintain all fences within the interior of the BTWMA grazing system and all fences on private lands and BTWMA/Sieben Live Stock grazing boundaries during lease years. Lessee will also maintain water tanks and monitor cattle use

Annual payment will be made upon completion of the grazing season and prior to December 30 each year. Payment will be based upon the records provided by Sieben Live Stock regarding actual animal stocking rates (AUM's) during grazing seasons of use.

Salting, and/or mineral grounds will be the responsibility of the lessee. Salt/mineral grounds shall be placed at locations mutually agreed upon by the lessee and FWP. Sites are to be moved periodically and according to mutual agreement. Spring/water developments will be considered on an as-needed basis and will be approved on any WMA lands upon mutual agreement of both parties (lessee and department) as in past leases.

The BTWMA / Sieben Live Stock Grazing System plan and lease document will be employed during the term of this lease. Other contingencies may apply to Bureau of Land Management (BLM) and Department of State Lands (DNRC) leases, which make up the remainder of the allotment(s).

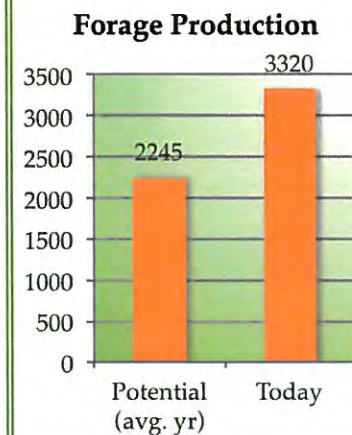
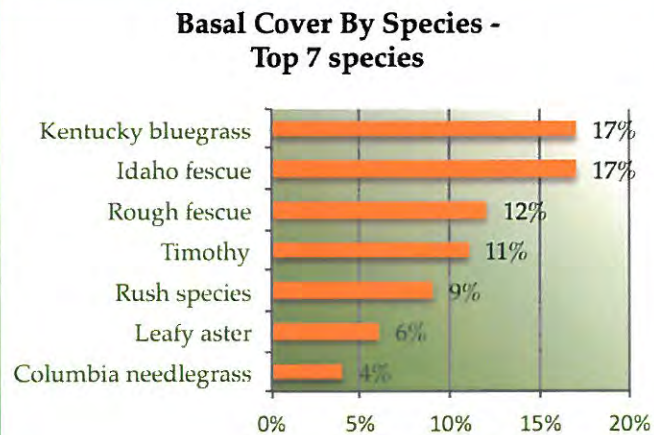
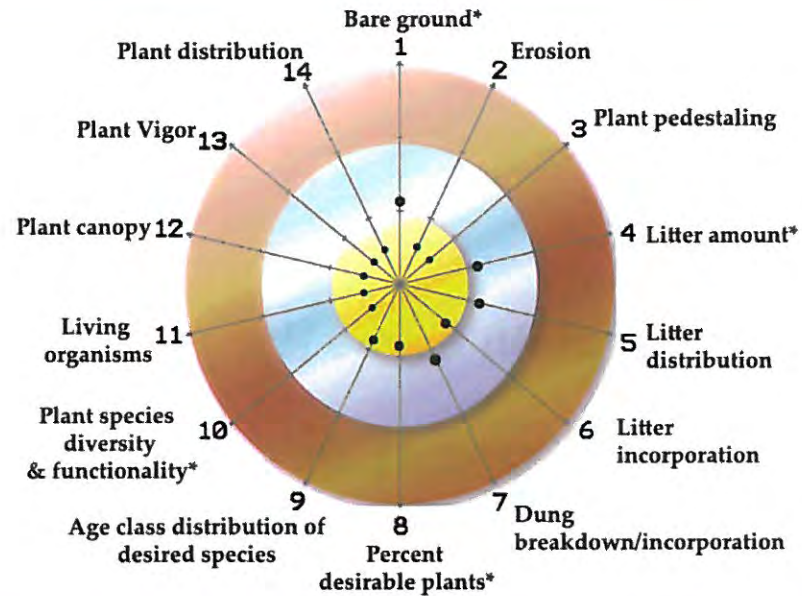
## **Beartooth Game Range**

### **Transect T9**

### **Data Summaries**



## Bullseye Rangeland Health Target



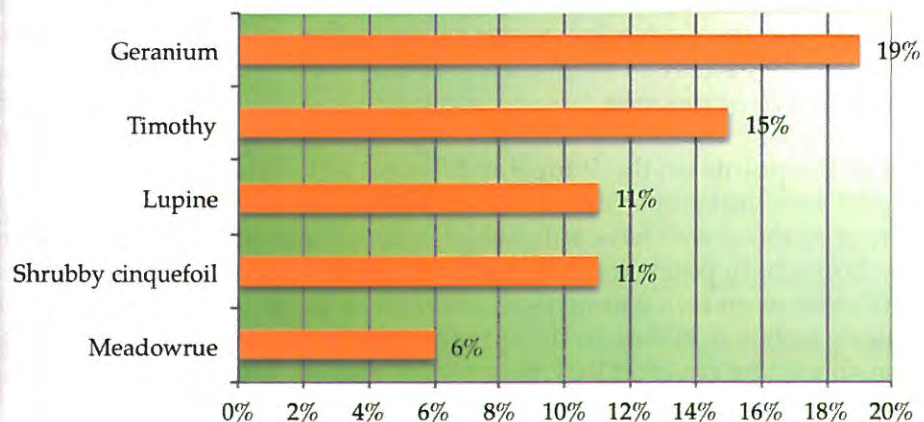


Transect View



Quadrat View

### Predominant Species: Composition by Weight



### Plant species encountered at site: 31 species

Timothy	Arnica species
Wildrye species	Dandelion
Rough fescue	Hairy fleabane
Idaho fescue	Black-eyed Susan
Columbia needlegrass	Meadowrue
Kentucky bluegrass	Salsify
Mountain brome	Vetch species
Prairie junegrass	Fringed sage
Bluebunch wheatgrass	Missouri goldenrod
Oatgrass species	Fanweed
Rush species	Rocky Mountain iris
Western yarrow	Clover species
Lupine	Shrubby cinquefoil
Rose pussytoes	Woods rose
Wild geranium	
Northwest cinquefoil	
Indian paintbrush	



## Beartooth Game Range Transect T9

This transect was established on July 25, 2011. The site was chosen in the Game Range not far from the Beartooth/ #9 gate in an open meadow that was representative of the area.

Most of the points on the Rangeland Target fell within the gold area, but some indicators fell within the silver. The first of these was **bare soil**, which was too abundant here. Some bare patches were scattered around the site (some were even two feet across), and one of these smaller patches is visible in the quadrat photo above. These should be covered by living plants and/or litter material. No signs of **erosion** or **plant pedestaling** were observed. The water cycle was functional here, but room for improvement existed.

Additional **litter amount** was required to help cover that bare soil and prevent any future erosion. Litter was not well **distributed** across the soil surface (those bare patches again), but was **incorporating** well with soil. The speedy incorporation observed suggested soil microbes were active. Conversely, area dung piles appeared to be breaking down more slowly. This suggests insects were less active, and the **breakdown** process was functioning more slowly than desired.

Within the successional process, the **percent desired plants** was high. Some lesser-desired species like Kentucky bluegrass and timothy were prominent, but desired fescues, needlegrasses, and mountain brome

were present and in abundance. No noxious weeds were present at this site. Different **age classes** of desired bunchgrasses were evident on the soil surface, suggesting the different needlegrasses and fescues were increasing their presence in the community. This was a positive sign. Further, with 31 plant species found here, **diversity** was high.

Energy flow was high at this site. A robust **plant canopy** was found (see the quadrat photo), and **plant vigor** was high. Plants were also well **distributed** across the soil surface, with the exception of those gaps. Most sunlight energy was intercepted by living plant leaves rather than striking the soil surface where it was lost.

The **basal cover** pie chart depicts the balance of live plant cover, litter cover, and bare soil. At 4% bare, this number was acceptable, but management's goal should be to reduce bare ground to less than 1%.

The **basal cover by species** bar graph depicts the seven most abundant perennial plants found on the soil surface. Note the low percentage contribution of each of these species (especially as compared with the other sites like White Tail where Kentucky was 63%). No one plant species dominated this site, which was a positive finding. Further, plants like the fescues, Columbia needlegrass, the rush, and the aster were desired species, and they composed much of the community. These were positive findings, and their close percentages display strong diversity in this plant community. The average distance to the nearest perennial plant was 0.7 inches, which was a

bit high for this area. As a 20+ inch precipitation zone, this site should display tighter plant spacing, and that figure should ideally drop to about 0.5 inches.

**Forage production** was high at 3320 pounds per acre. NRCS classified this site as a Silty 20+ ecological site whose average year potential production was 2245. Given the wet year of 2011, this site easily surpassed its average year potential.

The **composition by weight** table shows the top five most productive plants as measured by weight. The three forbs (geranium, lupine, and meadowrue) were all desired species that should produce greatly in wet years like 2011. The timothy was a less-desired grass, and shrubby cinquefoil was a less-desired shrub. Ideally, more perennial bunchgrasses like fescues, wheatgrasses, wildryes, oatgrasses, and needlegrasses would be seen on this list to replace timothy and cinquefoil.

#### *Management recommendations*

The data presented above portray a site of high rangeland health. The water cycle was effective, the mineral cycle was rapid, successional complexity was high, and energy flow was high. That being said, room for improvement existed. More litter was desired to help cover those bare patches, and shifts in plant species composition were needed. The means of achieving this improvement begins with the grazing utilization rate. Management must ensure a moderate utilization level (figure 30 – 50% of the standing crop) that will leave plenty of plant material to fall to the soil surface as litter

(assuming wildlife don't harvest what's left). This will ensure that the perennial bunchgrasses maintain root growth (most perennial bunchgrasses cease root growth at rates above 50%) and they remain competitive with species like Kentucky bluegrass and timothy. Each of these plants is competing for space on the soil surface, and maintaining a robust root structure on the desired grasses will help keep them remain competitive with the increasing species like Kentucky bluegrass.

Management should also take a closer look at those bare patches found at the site. Some of these were large and resulted in greatly reduced plant cover and productivity. What was causing them? Were aging cow pies being disturbed, thus leaving a bare spot on the soil surface? If so, then some animal impact may be warranted here. Consider chopping a salt block into small pieces with a hammer and scattering it over this area. Allow livestock to thoroughly trample the salted area as they seek the small salt pieces. This should apply a dose of animal impact that will disturb aging cow pies, will incorporate and distribute litter, and will provide a rapid advancement in the rate of mineral cycling.

#### *Early-warning indicators*

Early-warning indicators provide managers rapid feedback regarding how their management actions are affecting a particular site. Should implemented plans be taking a site away from a desired state, managers must make changes quickly before costly and time-consuming corrections are needed. Early-warning indicators

provide those first glimpses at a site that something is awry and course corrections are needed.

If management actions are improperly applied here, look first for reductions in plant vigor and increased bare soil. These suggest utilization rates have been excessive. Next, look for reduced plant canopy and increased shrubby cinquefoil. The cinquefoil is a plant whose great abundance was undesired here (a few plants are not a problem, but lots of them are). Such an increase suggests further issues with grazing management, particularly with recovery periods between grazings and grazing durations.

If management actions are properly applied, look first for maintained plant vigor, even in years not as wet as 2011. Then look for reduced bare soil. Lastly, look for shifts in species composition toward the more desired perennial bunchgrasses.

## NUTRIENT ANALYSIS

The ranch has experienced reduced livestock performance in recent years, and every effort is being made to determine the cause of these problems. To that end, forage samples were collected at each of the study sites in 2010 and 2011, and the samples were sent to a lab to determine nutrient composition. Should toxic levels of a particular nutrient be causing the performance issues, then the nutrient analysis may help pinpoint the cause. Those toxic nutrients may be high levels of iron, or manganese, or imbalances in calcium to phosphorus ratios. Each of these may result in a reduced cow immune system with poor breedback and calf health issues. The nutrient samples may provide insight into the cause of the problem.

As was done in 2010, a single plot was clipped to determine forage production. Plants from that clipping were then sent to Midwest Labs in Omaha, NE for analysis. The results are displayed to the right.

	Middle Taylor	West Middle	Whitetail Prairie	Beartooth Game Rng.
Crude Protein (%)	12.2	8.46	7.31	9.73
Acid Detergent Fiber (%)	34.4	34.5	38.9	30.3
Total Digestible Nutrients (%)	63.3	63.2	58.2	68
Net energy-lactation (Mcal/lb)	0.65	0.65	0.59	0.7
Net energy-maintenance (Mcal/lb)	0.63	0.63	0.57	0.69
Net energy-gain (Mcal/lb)	0.35	0.35	0.33	0.42
Sulfur (%)	0.22	0.12	0.12	0.13
Phosphorus (%)	0.3	0.19	0.23	0.3
Potassium (%)	2.43	2.11	1.51	2.34
Magnesium (%)	0.15	0.12	0.13	0.16
Calcium (%)	0.62	0.45	0.35	0.93
Sodium (%)	0.01	0.01	0.01	0.01
Iron (ppm)	94	58	107	83
Manganese (ppm)	59	37	28	56
Copper (ppm)	6	4	4	4
Zinc (ppm)	32	22	13	38

To be present in toxic quantities, nutrients such as iron and manganese must be 1000 ppm, levels well above those found in the above table. Further, calcium to phosphorus ratios should not exceed 7:1, and the highest of these (Beartooth) was 3:1. None of the nutrients above appears at toxic levels. The four samples shown above and five collected in 2010 do not provide evidence that reduced livestock performance was caused by toxic nutrients in the forage.

From a nutritional standpoint, most of the samples above would meet the major needs (crude protein, total digestible nutrient, calcium, phosphorus) of an 1100-pound lactating cow. The exception to this is the Whitetail sample, which was short on crude protein and phosphorus. Fortunately, because of the pasture

rotation, livestock would not spend too much time on this forage where nutrient shortages would matter. These samples display good summertime nutrient content.



## MONITORING METHODS

On July 19, 2011 Chase Hibbard and Tandi Tomt of Sieben Livestock and Todd Graham of Ranch Advisory Partners toured the ranch, examining potential study sites. They selected five study sites to be sampled in 2011.

In July and August 2010, Tomt and Graham read those transects. They laid out a 200-foot tape measure along the soil surface that served as the basis of the monitoring protocol. A variety of methods were then conducted from this tape measure (Figures 1 and 2).



*Figure 1: five-gallon bucket lids used to mark transect locations*

Each location was photographed and described. This description included a list of plants, activities of animals, and type of soil and terrain. A background field form was used to record the following information:

1. Site name;
2. Date;
3. Investigators;
4. Location description;
5. Details of transect layout and orientation;
6. Production characteristics (from area soil survey);
7. Current weather conditions;
8. History of pasture use;
9. Wildlife observations;
10. Soil characteristics;
11. Vegetation characteristics; and
12. Reasons for site choice.

A photograph was taken of a quadrat at each site, where the quadrat was placed at the 10-foot mark along the transect line (Figure 3). This photo will be used in successive years to display changes in the site.



*Figure 2: Permanent transects were 200 feet long and were permanently marked on each end. [This site lies in Colorado.]*

A qualitative analysis of rangeland health was first conducted at the site where 14 indicators of rangeland health were examined. These indicators portray function of four fundamental ecosystem processes: the water cycle, mineral cycle, successional process, and energy flow. These were described more formally earlier in this report.

A rangeland health qualitative scoring guide accompanies this document that portrays how each of the 14 indicators was evaluated. Each indicator is assigned a "score" as functioning optimally, functioning less than optimally, or not functioning well. Using a target representation, called the "Bullseye Target," and colors of the Olympics, "scores" of indicators are placed on the Target in the associated color of function (Figure 4). If, for example, the indicator litter distribution displayed uniform cover across the soil surface, this indicator was considered functional, and a mark was placed in the gold area on the Bullseye Target.



*Figure 3: The first plot on a transect. [This plot lies in Colorado.]*

The result of evaluating rangeland health indicators in this way is a graphic portrayal of ecosystem process function. Management may view the Bullseye Target and determine where high function exists at the site and where further management attention is required.



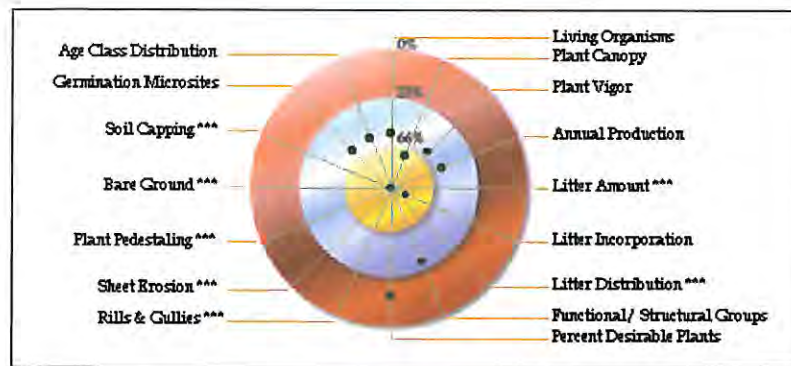


Figure 4: The Bullseye Target portrays results of each of the 16 indicators studied based on field scores.

Using the web-based soil report generator (available at: <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>), a custom soil survey was generated for the sample area. From this report, the Natural Resources Conservation Service provides information on desired plant species, expected shifts in species composition under differing management regimes, and expected productivity of a site. Using this information, indicators for desired plant species, functional and structural groups, and other indicators may be considered.

One of the uses of the soil report is generating current forage production versus that which is expected for the site. A single plot was clipped at each site, and the resulting clippings were dried, weighed, and converted to pounds per acre production. A bar graph accompanies each site report showing "today's"

production along with that from an average year at the site (Figure 5).

A sample of forage plants most likely to be selected by cattle is sent to Midwest Labs, Inc. in Omaha, Nebraska. The nutrient analysis returned is presented in the body of this report.

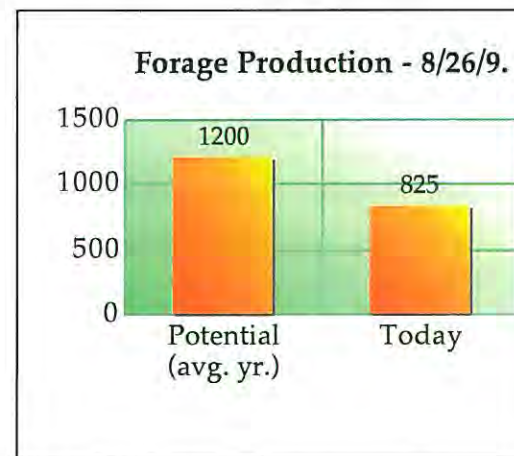


Figure 5: Plant production on sample day as compared with the site's potential from the soil survey.

Another study conducted involves determining which species are producing the most at each site. Using the transect's tape measure, 10 quadrats are evaluated to determine which species produce the most by weight within the quadrat. The first plot is examined at the 10-foot mark on the transect, the next at 30 feet, the next at 50 feet and so on until 10 transects have been evaluated. While looking in each study plot, that species estimated



to be most abundant by weight is scored. A value of “5” is then assigned for that species. The next most abundant by weight received a “4” and so on until the five most abundant species by weight have been recorded. The procedure is repeated for all 10 study plots. The percentage composition of each species is calculated based on its scoring versus other species encountered in the plots. The most abundant will have the highest scores and the highest percentage composition. A chart with the five heaviest species is then generated like the one featured in Figure 6 below.

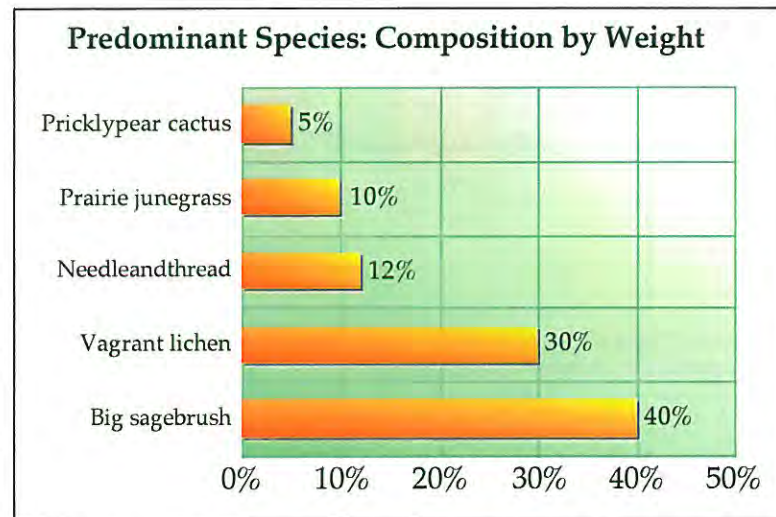


Figure 6: The most abundant species as composition by weight.

The methodology also uses the 200-foot tape measure as a base for collecting information such as basal cover,

relative basal plant spacing, and relative basal plant spacing by species. Using this method, commonly known as point intercept, a steel rod is lowered to the soil surface using at intervals of every-other foot for 200 feet. (Figure 7).



Figure 7: Utilizing the point intercept method to collect three quantitative measures of rangeland health. The steel rod is lowered to the soil surface to gather basal cover data. The distance to the nearest perennial plant is measured (in this case, a plant lies 3 cm from the rod) and that distance is averaged over 100 data points. Lastly, the nearest perennial plant's species is recorded (in this case, it is a Western wheatgrass). [This is a Wyoming ranch photo.]

At each point, basal cover is classed as bare soil, litter, or live plant cover. After examining all 100 points, the percentage of each class is calculated. A pie chart is generated portraying the results (Figure 8).

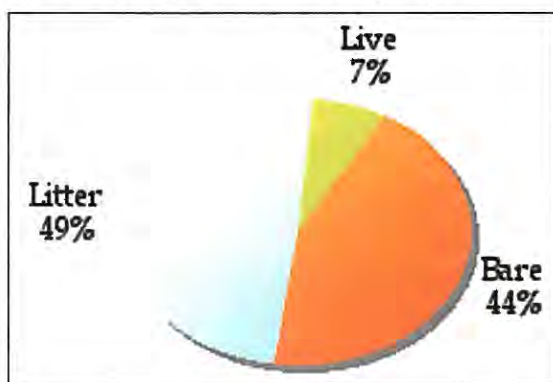


Figure 8: The basal cover chart generated by using the point intercept method.

Additional measures are also taken using the point intercept. At each point ground cover data was collected, the distance to the nearest perennial plant was measured. The average distance for all 100 points is calculated and the average distance to nearest perennial figure is found and displayed in the "Additional Information" box. Simultaneously, this nearest plant's species was recorded. The seven species representing the closest perennial plants are portrayed in the "Basal Cover by Species" bar graph (Figure 9).

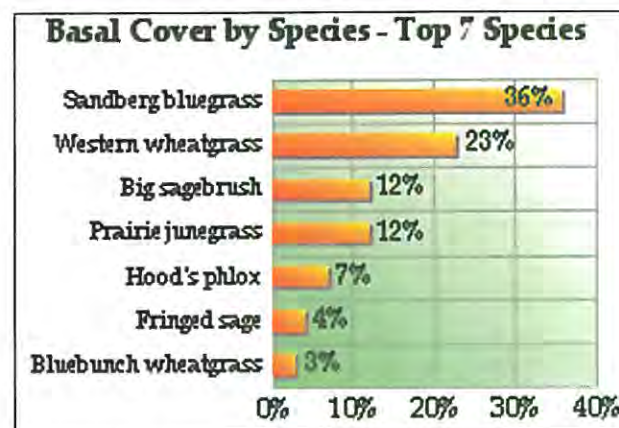


Figure 9: Basal cover by species bar graph created by measuring the distance to the nearest perennial plant using the point intercept method. The seven most numerous species are displayed here.

This means of collecting plant basal cover data was developed by the Holistic Management International in Albuquerque, NM.

The scoring guides reference earlier in this Methods section may be seen on the following pages. They were taken from the *Bullseye! Achieving Your Rangeland Health Objectives* available at:

[http://www.ranchadvisory.com/rangelands\\_monitoring/](http://www.ranchadvisory.com/rangelands_monitoring/).



### SCORING GUIDE SIDE 1

		Gold: Achieving Goal	Silver: Moving Toward/Away from Goal?	Bronze: Not Achieving Goal
1	Bare Ground*	Amount and size of bare areas nearly to totally match that expected/ desired for site.	Amount and size of bare areas higher and larger than expected/desired for site. Bare areas may be large and sporadically connected.	Amount and size of bare areas are much higher and larger than expected/desired for site. Bare areas are generally connected.
2	Erosion	Little to no evidence of wind or water erosion, including desert pavement, rills, and/or gullies.	Some signs of soil loss, including formation of desert pavement, rills, and/or gullies.	Soil is actively leaving the site. Advanced formation of desert pavement, rills, and/or gullies may be seen.
3	Plant Pedestaling	No to minimal plant pedestals present.	Some to moderate plant pedestals present. No signs of exposed roots.	Plant pedestaling obvious and tall. Root exposure seen.
4	Litter Amount*	Amount of litter nearly to totally matches that expected/ desired for site.	Amount of litter less than that expected/desired for site.	Amount of litter much lower than expected/desired for site.
5	Litter Distribution	Litter is uniformly distributed across site.	Less uniformity of litter distribution. Litter may be becoming associated with prominent plants or other obstructions.	Litter distribution not uniform. This may be due to general lack of litter and/or obvious patchy appearance of litter amount.
6	Litter Incorporation	Litter mixing well with soil, resulting in more rapid mineral cycle.	Some mixing of litter with soil. Litter may be elevated and its amount may be reduced. Mineral cycle not as rapid.	Litter not mixing with soil. Litter may be elevated and/or amount too little. Mineral cycle slower.
7	Dung Breakdown/ Incorporation	Dung breaking down rapidly, less than one year old.	Some dung breakdown, with most being around 2 years old.	Dung breaking down slowly, older than 2 years old.

\*Refer to ecological site descriptions available from NRCS

## SCORING GUIDE SIDE 2

		Gold: Achieving Goal	Silver: Moving Toward/Away from Goal?	Bronze: Not Achieving Goal.
8	Percent Desirable Plants*	Greater than 66% of plants in the area are desired. Remainder of plants are intermediate species (neither desired, nor undesired).	33% to 66% of plants species in the area are desired. Intermediate species (neither desired, nor undesired) have strong presence. Potential presence of undesired species.	Less than 33% of plant species in the area are desired. Intermediate plant species (neither desired, nor undesired) dominate. Undesired species also present.
9	Age Class Distribution	Variety of age classes seen in the area (seedling, young, mature, decadent).	More mature age classes present, seedlings and young mostly lacking.	Primarily old and/or deteriorating plants present.
10	Plant Species Diversity & Functional- ity*	Number of plant species in the area matches that expected for site. Plant forms (grass, shrub, forb, tree) also match that expected for site. Plants serving different functions.	Number of plant species in the area below that expected for site plant forms (grass, forb, shrub) reduced. Reduced functionality.	Number of plant species the area minimal. Plant forms (grass, forb, shrub) much below that expected for site. Poor functionality.
11	Living Organisms	Abundant signs of non-plant life.	Few to moderate signs of non-plant life. Something is missing from community.	Next to no signs of non-plant life. Components of the ecosystem are clearly missing.
12	Plant Canopy	Strong photosynthetic activity in the area. Canopy may cover greater than 66% of area.	Moderate photosynthetic activity in the area. Canopy may cover 33-66% of area.	Reduced photosynthetic activity in the area. Canopy may cover less than 33% of area.
13	Plant Vigor/ Color	Capability to reproduce (seed or vegetatively) not limited relative to recent climatic conditions. Growing plant exhibits bright green color.	Capability to reproduce (seed or vegetatively) is somewhat limited relative to recent climatic conditions. Growing plant exhibits pale green or may be yellowing.	Capability to reproduce (seed or vegetatively) is severely reduced relative to recent climatic conditions. Growing plant exhibits sickly yellow coloration.
14	Plant Distribution	Plants uniformly distributed across soil surface.	Distribution becoming fragmented, but some areas of uniformity.	Distribution obviously fragmented.

\*Refer to ecological site descriptions available from NRCS



## **RANGELAND HEALTH**

In its 1994 report Rangeland Health, the National Research Council defined rangeland health as the degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained. Range in good health produces more forage and better wildlife habitat, while watershed condition is improved, resulting in more stable stream flows and higher water quality (NRC, 1994). Healthy range generally supports more plant and animal diversity and provides greater ecological stability in terms of productivity and population flux.

The monitoring methods used here were intended to observe changes in rangeland health through time. Both qualitative observations and quantitative methods were employed. Both are intended to provide decision-making information to land managers. Methods used in generation of this report are aligned with the findings with the Rangeland Health document.